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ABSTRACT

This document is intended to help school psychologists promote more effective generalization of school intervention programs for education students. Concepts (including transfer of training and response generalization) are reviewed. An approach is described which analyzes problem behavior according to its major controlling variables (skills or motivation) and develops an intervention plan specifying behavior change as well as behavior transfer and maintenance. Flow charts depict the principles and are followed by examples illustrating the model's application to children with behavioral and academic problems. (CL)

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Performance Analysis and the Generalization Problem

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PERFORMANCE ANALYSIS AND THE GENERALIZATION PROBLEM

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September, 1983

PERFORMANCE ANALYSIS AND THE GENERALIZATION PROBLEM

The purpose of this paper is to describe a strategy for promoting more effective generalization of school intervention programs. If, as a school psychologist, you have participated in designing and conducting a successful special education program, you would like to be able to see the behavioral benefits of that program continue. And yet we know that sometimes these successes are brief or seem to be restricted only to the settings where the program was originally conducted. The failure to see a positive behavioral change in a student last or transfer to other situations is typically referred to as "failure to generalize." We intend to describe a plan which will minimize these failures, or at least will be a strategy to help you anticipate where future difficulties along such lines might lie.

To begin, though, it is important to acknowledge that these failures-to-generalize problems are really the result of special education successes. If you have not adequately dealt with some problem behavior, even if only in a restricted setting, or with a special intervention strategy, or through the use of highly trained personnel, then you won't need to worry about whether the success can be continued or repeated by others. In other words, to even be concerned about whether a behavior change will "generalize" implies that you have at least been able to produce a behavior change that is worth generalizing.

Concepts in Generalization

Before describing a system of analysis which may help deal with these problems, it is worth becoming more specific regarding the various situations in which such generalization failures are said to occur and the various ways such failures are typically described.

One situation is that in which a behavioral change is effected in a single setting but does not occur in another. For example, a student's disruptive outbursts in class may be successfully controlled in a resource room but recur when the youngster returns to his or her home classroom. Similary, a student's cooperative behavior in direction following may be relatively strong for one teacher yet is lacking for another, or at home. The technically correct way to describe these situations is as examples of the lack of "stimulus generalization". Any behavioral improvement appears to be exclusively under the control of the stimuli of a single situation. The control of these environmental stimuli, probably including such variables as the physical setting, people involved, and planned or unplanned behavioral consequences, simply do not generalize to a different stimulus situation, where different physical settings, individuals, and behavioral consequences may be in effect. Whatever the differences are, they are sufficiently large to fail to promote the new behavior's occurrence in the changed setting.

Another important "failure to generalize" occurs when one specific behavior change is produced, but apparently related behaviors remain unchanged. For example, a teacher may be successful in getting a youngster to "apply himself" to his reading, but the student's behavior regarding other kinds of academic tasks stays the same. The attention to task that the teacher was able to instill regarding one type of subject matter did not "generalize" to other areas.

This type of failure, where a program's success seems to be narrowly restricted to a particular behavior is correctly referred to as a failure of "response generalization", or as it was originally called, response induction.

Behavioral methodologists recently have tended to place these two categories of problems into a single class, since (perhaps) what one has to do to solve them may have little to do with what you call them. It is at least terminologically simple. Nevertheless, it is our preference to emphasize the fact that there really are two quite different behavioral processes in operation in these two categories of situations.

If, for the sake of convenience, only one term is used to collectively label these problems, then we suggest the less technically sounding labels of either a lack of generality or a failure to achieve a transfer or training. These layman's terms do not seem to imply a single underlying behavioral process and as indicated, there really are two quite different principles involved.

A third type of problem is that of the duration of the program's effect. How long does the behavior change last? This kind of problem isn't often confused with the transfer of training situations as described earlier, but is nevertheless ar important dimension of the effectiveness of an intervention program. These problems are best referred to as ones concerning behavioral maintenance, and typically are under the control of behavioral schedules of reinforcement.

In summary, when a student's behavioral problem is identified and addressed by a special program, you expect the successful solution to be one which (1) transfers to a variety of settings, certainly at least to all those where the problem behavior is at issue; (2) is effective for behaviors of the same general class; and (3) is a change which lasts, maintains or endures.

The reason for reviewing behavioral terminology regarding problems of obtaining behavioral transfer or maintenance was simply to emphasize the fact that these failures are the predictable result of certain well-known behavioral facts of life. Stimulus generalization occurs when situational stimuli are similar and does not ocur when they are not. Response generalization or induction occurs principally within and typically not across different classes of operant behavior - and operants are defined in terms of their consequences, not their appearance. Behavioral maintenance depends upon several factors, mostly having to do with the specific nature of the behavior's schedule of reinforcement compared to those of alternative behaviors.

Planning for Generality

Behavioral psychologists have noted the fact that the behavioral processes related to stimulus and response generalization tend to lessen rather than enhance the likelihood of producing a generality of treatment effect. It is simply the nature of most special education programs, which often isolate and provice unique services to a student whose behavior is in one way or another a problem, to be a procedure likely to produce a behavioral change which is localized to the treatment situation.

Authors, such as Stokes and Baer (1977), have suggested that one way of coping with this predictable problem of getting the behavioral change out of the intervention setting is to include certain methods of enhancing the likelihood of generality of effect from the outset of treatment. This is a behaviorally sound strategy, of course, and the only problem comes in knowing which generalization strategy to use. These authors have suggested somewhat of a trial-and-error approach which will become effective either as a result of finally hitting upon a successful strategy or simply as the result of the accumulated efforts to produce the transfer. Some of these methods, in fact, succeed by virtue of introducing a second treatment plan in the new setting.

Most of the methods described by Baer and his colleagues are excellent ones and, if systematically implemented, are likely to eventually produce the sought-after generalization effect. But it often is easer to avoid the necessity for such generalization programming, or at least be able to analyze the problem so well from the outset, that the psychologist's plan permits precise, rather than if-at-first-you-don't succeed type programming for transfer and maintenance.

THE PERFORMANCE ANALYSIS

The approach described here is one which begins by analyzing the initial problem behavior in terms of its major controlling variables. This includes categorizing the performance problem as one related either to a "skill deficiency" or a "motivational deficiency". The approach then proceeds by developing an intervention or treatment plan that takes the preliminary analysis into account for the purposes of developing the eventual transfer and maintenance of its behavioral change goals. In other words, a "performance analysis" precedes and determines the nature of the behavioral programming for both behavior change and behavior transfer and maintenance. This approach has often been called a "front end analysis" when applied in business and industry, and it has been used to determine the nature and extent of training that is necessary to solve organizational productivity problems.

Skill vs. Motivation

Miller, in his book Behavioral Management, provides a simple framework for beginning such an analysis:

1. We begin with a general statement of the performance problem, e.g., "poor classroom conduct, "poor academic performance, "poor social skills."

GENERAL PERFORMANCE DEFICIENCY

1

2. We use the general statement as a basis for describing a specific, measurable performance goal such as "50% fewer fights," "90% on homework assignments."

GENERAL PERFORMANCE DEFICIENCY

1

MEASURABLE GOAL

2

3. The goal statement allows us to pinpoint the behavior with which we wish to work, e.g., "keeping hands off other children," "checking arithmetic problems before turning them in."

GENERAL PERFORMANCE DEFICIENCY

1

MEASURABLE GOAL

2

PINPOINTED BEHAVIOR

3

3. With the behavior now pinpointed, we now must ask:

"Can behavior be performed?"

GENERAL DEFICIENCY

1

MEASURABLE GOAL

2

PINPOINTED BEHAVIOR

3

CAN THE BEHAVIOR BE PERFORMED?

4

If the answer to this question is "Yes," then it is very likely that we have a <u>motivational</u> or <u>reinforcement problem.</u>

CAN THE BEHAVIOR BE PERFORMED?

4

"Yes"

Motivation Problem

If the answer to this question is "No, then it is very likely that we have a skill deficiency or repertoire problem.

CAN THE BEHAVIOR BE PERFORMED?

"No"

Skill Problem

Several questions aid us in determining whether we have a motivational or skill problem:

1. Has the performance occurred in the past? If the answer is "Yes" a motivational problem is likely; if "No," a skill problem is indicated.
2. How complex is the task? If the task is complex, a skill problem may be indicated; if the task is simple, a motivational problem may exist.
3. Do temporary, powerful contingencies evoke the response? If "Yes," a motivational problem may be derined; if "No," a skill problem may be present.
4. Are current contingencies reasonably likely to evoke the performance? If "Yes," a skill problem may exist, if "No," a motivational problem may be indicated.

The Generality Matrix

We can now combine the skill/motivational analysis with a transfer of training/maintenance analysis, to construct a framework or matrix for examining issues critical to promoting the generality of a behavior change program. This framework creates a decision matrix which will help determine both the nature and locus of the intervention program. These decisions will in turn affect the generality of the program.

GENERALITY MATRIX

	A. Transfer of Training	B. Maintenance
Skill		
Motivation		

Transfer of Training

We will deal first with the transfer of training portion of the matrix. Whether we have a skill or motivational problem, a decision must be made about whether to employ one or multiple settings as part of the intervention program.

GENERALITY MATRIX

A. Transfer of Training

	One Setting	Multiple Settings
Skill		
Motivation		

If we have a skill problem, the decision about how many settings to employ probably turns only on the issue of most effectively and efficiently teaching the particular skill. If the skill can be taught in the single setting where the problem is in evidence, transfer of training is really not a problem. If the skill cannot be taught in the single problem setting, then use of multiple settings (e.g., resource and regular classroom) is acceptable. In fact, training may be easier outside the problem setting due to fewer distractions, etc.; in addition, since there is no demonstrated lack of reinforcement in the problem setting (i.e., when a skill problem exists), the newly learned skill may actually produce its own natural reinforcers in the problem setting. That is to say, the new skill may be maintained by consequences which had not occurred prior to the emission of the new skill. The use, therefore, of multiple settings for teaching new skills is at least OK, and it may even be advantageous.

A Transfer of Training

Use of:

	One Setting	Multiple Settings
Skill	GOOD	OK OR BETTER

If we have a motivation problem, the number of settings becomes a significant factor in determining the eventual generality of the program's effectiveness. If the response can be reinforced in the problem setting, then transfer of training is not, by definition, a problem. This is typically the most advantageous decision regarding the locus of program intervention.

A. Transfer of Training

Use of:

	One Setting	Multiple Settings
Motivation	GOOD	

When reinforcement programming is done in a setting outside the problem setting, then transfer of training becomes a critical factor. The nature and schedule of reinforcement may vary from training to problem setting,

decreasing the generality of program effects. The creation of multiple settings to remedy motivational problems should as a general rule be avoided. This point is made with the understanding that the use of multiple settings may, in fact, be dictated by the nature or severity of the problem and the programming resources that are available in the training settings being considered. The decision to use multiple settings should be made, however, with full knowledge of the transfer of training considerations involved.

A. Transfer of Training

	Use of: One Setting	Use of: Multiple Settings
Motivation	GOOD	BAD

Maintenance

We will now deal with the maintenance portion of the generality matrix. Once behavior is improved in the problem setting (regardless of whether the initial problem was one of skill or motivation) a maintenance issue is defined.

B. Maintenance

	Use of: One Setting	Use of: Multiple Settings
Skill		
Motivation		

	One Setting	Multiple Settings

A number of strategies exist for insuring that there will be reinforcement sufficient to continue the desired responses during maintenance:

1. Match competence level:

   Training should be designed so that the level of performance in the training situation matches the skill level of persons in the maintenance setting. When the skill level of the client is essentially equivalent to the client's peers, reinforcement for performance is likely to occur.

2. Make material reinforcing:

   There are a number of ways to present instructional material all of which may "teach" the same "lesson." Those materials which, by their design, maintain attention probably provide an instructional advantage over "boring" materials. Stories, puppets, plays, etc. may reinforce the child's attending, and thus increase the likelihood that the child will learn.

3. Make the teacher reinforcing:

   The teacher's powerful influence can remain even though occasional punishers may be required. The simplest procedure to make the teacher a reinforcer is for the teacher to generate a much higher density of reinforcers than punishers for students. Even in faulty performance there are aspects to reward; frequently rating the good work which is done causes the teacher to be more easily seen as a source of reinforcement.

4. Require the behavior as integral to something else: This is really a common strategy, but one which may be overlooked. For example, knowing multiplication is integral to performing division. The teacher could use or construct a game which in order to play or play well, the child must acquire particular skills. The same strategy can be used in the social skills area--in order to get juice and cookies the child must say "please" and "thank you."

Ultimately we work for maintenance in all settings, thus eliminating even the distinction between single and multiple settings.

MAINTENANCE

USE OF:

One Setting	Multiple Settings

MAINTENANCE

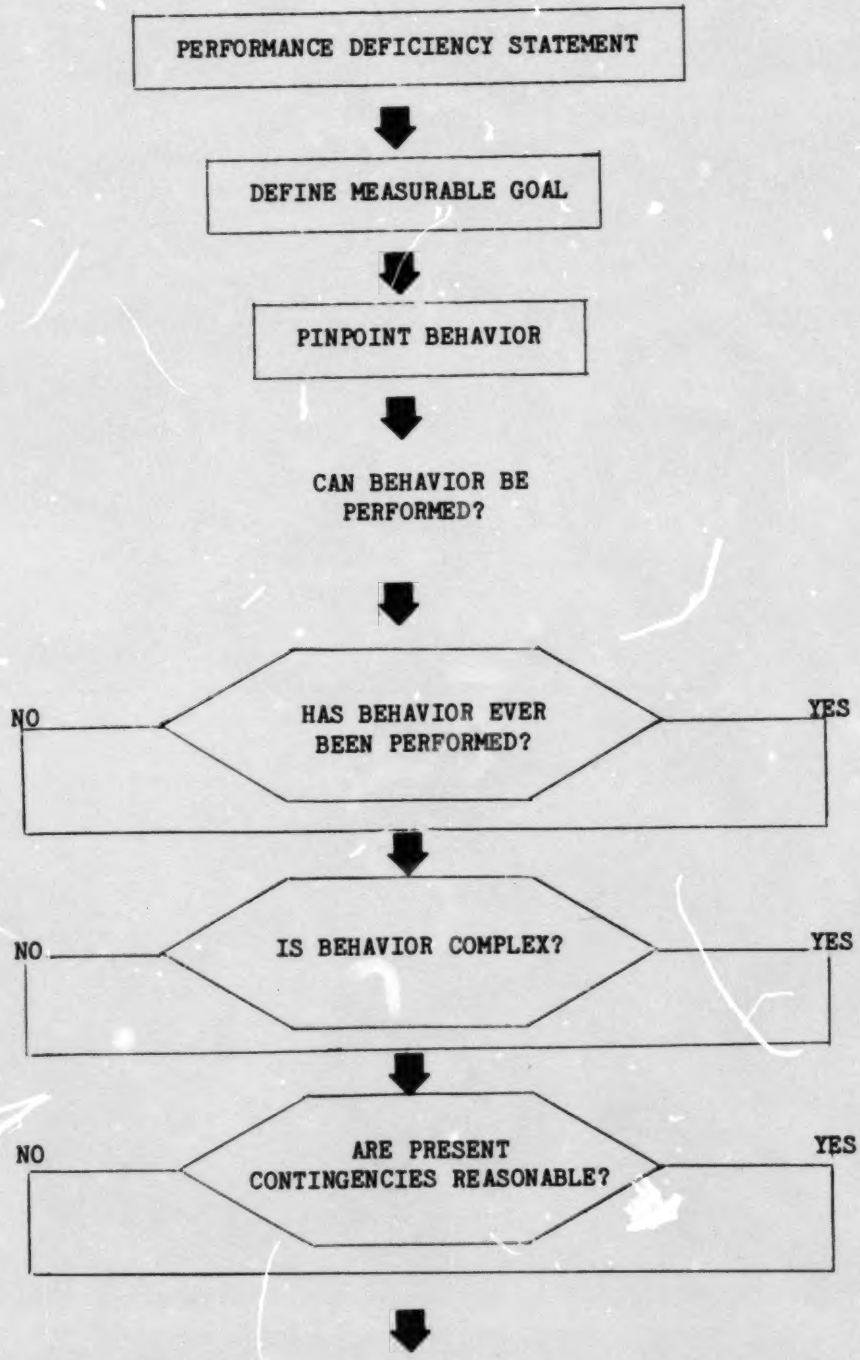
All Settings

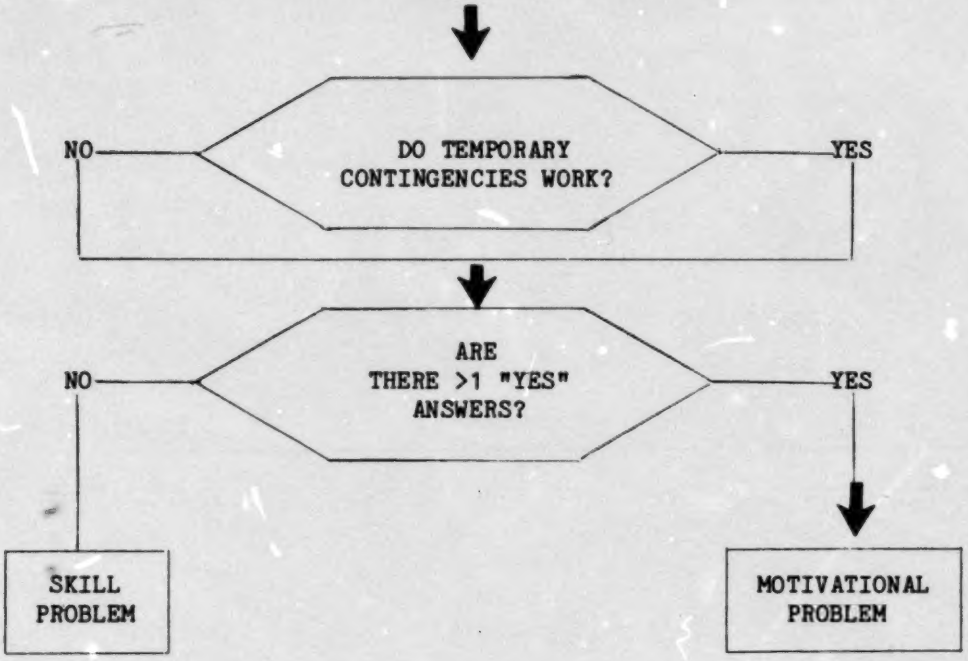
We should seek to avoid creating transfer of training problems by adding unnecessary treatment settings, and we should avoid creating motivational problems by selecting treatment reinforcers which are both available and potent in the maintenance setting(s).

Examples

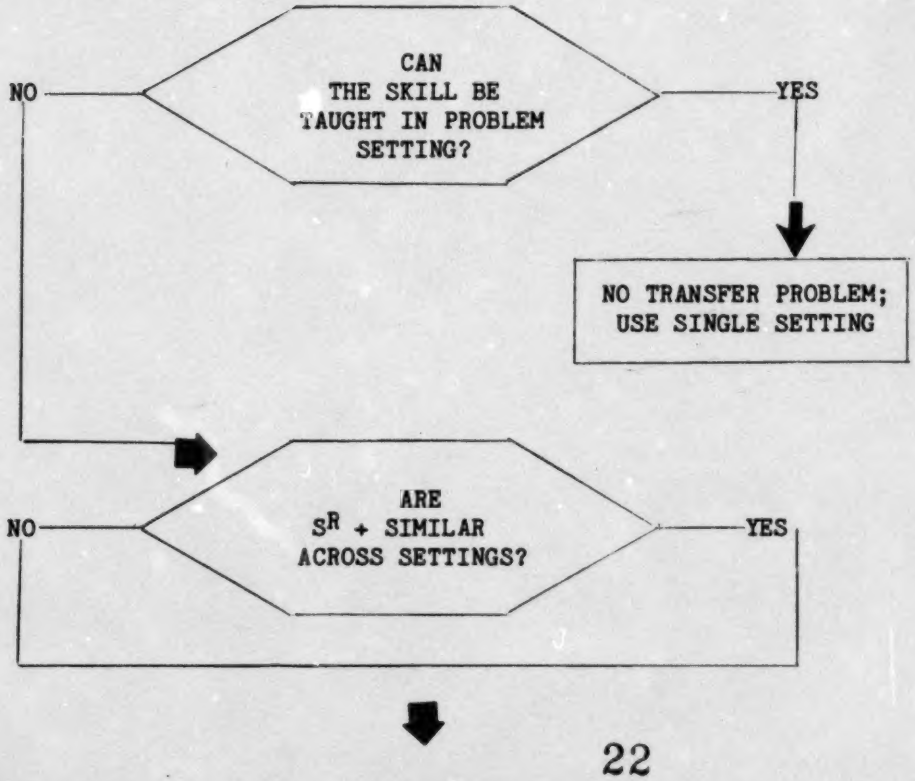
The following flow charts are a diagramatic representation of the principles described. They are followed by some examples of the process and actual implementation.

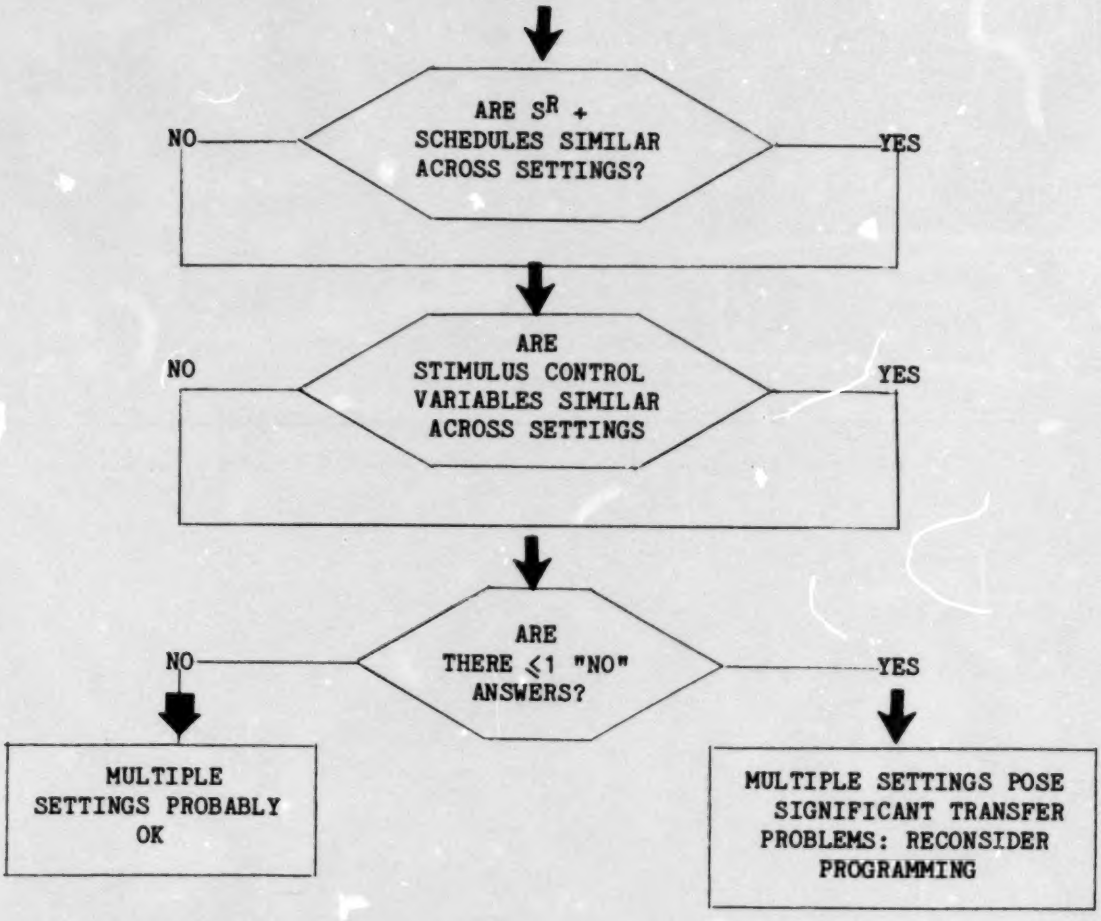
FLOW CHART FOR
PROGRAMMING FOR 'GENERALIZATION'



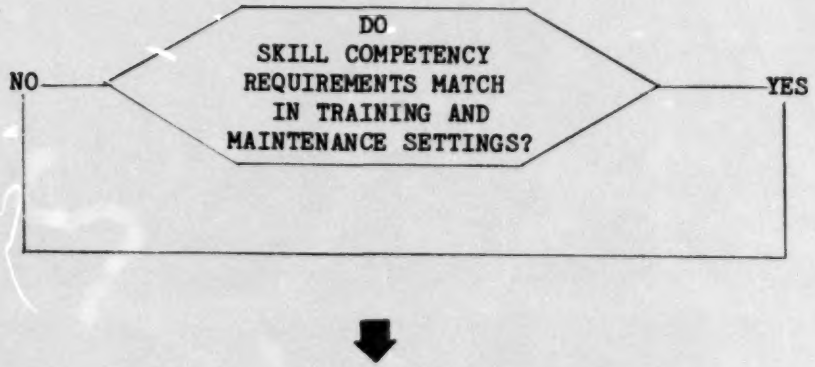


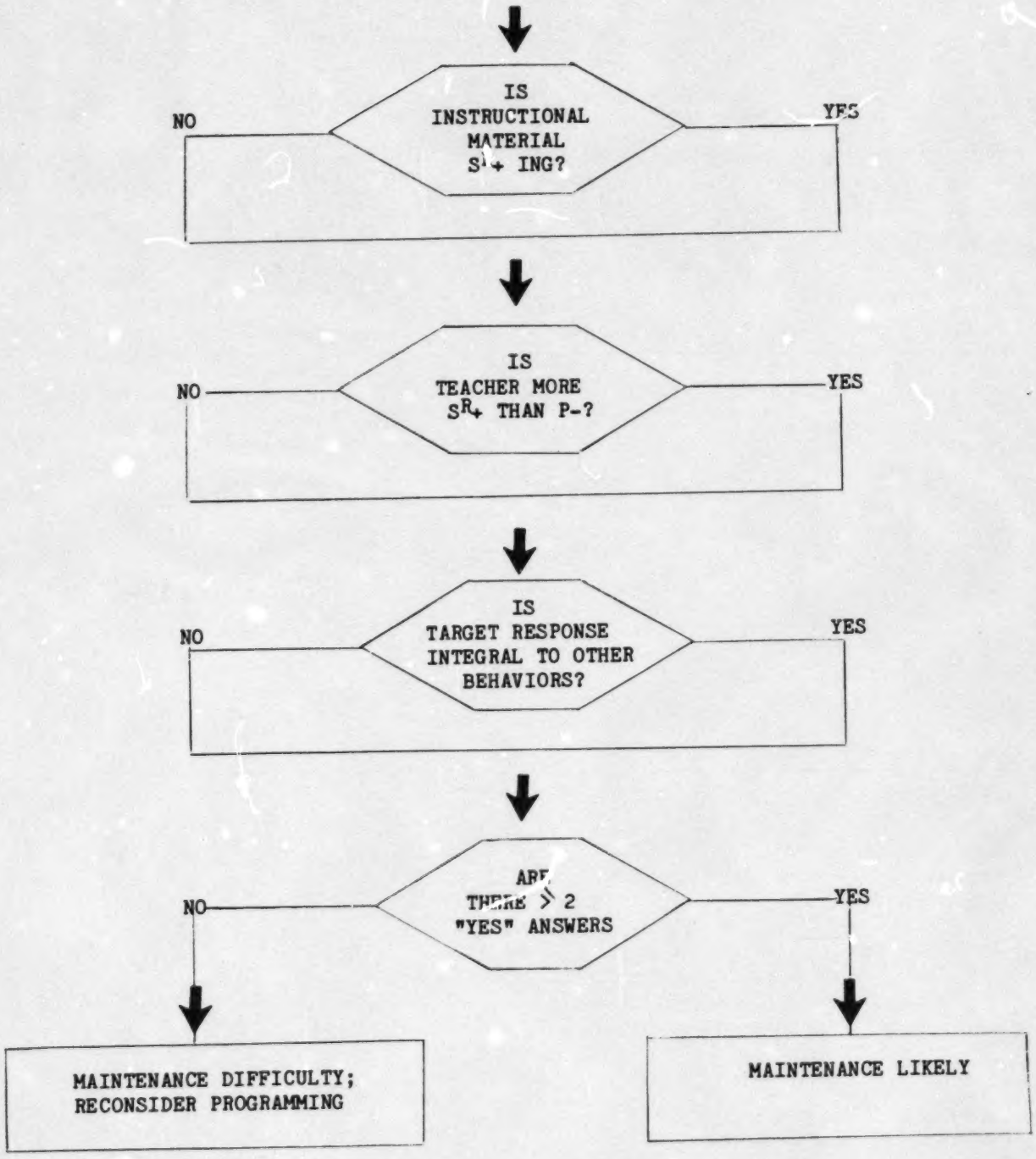
TRANSFER OF TRAINING
(SKILL OR MOTIVATIONAL PROBLEM)





MAINTENANCE




IS INSTRUCTIONAL MATERIAL S+ ING?
NO
YES
IS TEACHER MORE SR+ THAN P-?
NO
YES
IS TARGET RESPONSE INTEGRAL TO OTHER BEHAVIORS?
NO
YES
ARE THERE ≥ 2 "YES" ANSWERS
NO
YES
MAINTENANCE DIFFICULTY; RECONSIDER PROGRAMMING
MAINTENANCE LIKELY

EXAMPLE 1: RANDY

Problem Description

The first example, a 6th grade boy named Randy, was described by his teacher as withdrawn and not participating in informal peer interactions. An assessment indicated that a portion of Randy's problems appeared to be due to deficiencies in social skills. In the parent interview, Randy's mother indicated that she was concerned about his lack of interaction with family members and that, in particular, Randy seemed to avoid being with his father and older brother. Randy described himself as being very unhappy over his lack of friends and fearful of his brother and father. An intervention program for school and home was designed which included social approach skills as one component. The following description is of the school social approach skill sections of the program.

The general performance deficiency was social approach skills. The pinpointed behaviors, for the classrom, were: (1) to smile when he approached a peer, (2) to join play activities with peers, (3) to ask peers for help, and (4) to ask peers to play kick ball. The next step in the format is to ask if the behaviors can be performed? The best answer appeared to be no. The behaviors had never been observed and they involved generally complex tasks. An analysis of current reinforcement in the classroom indicated that they were maintaining social behaviors for peers. The resulting decision was that Randy had a skill deficiency rather than a motivational problem. See Performance Analysis Chart 1.

PERFORMANCE ANALYSIS 1
SCHOOL SETTING

Performance Deficiency Statement

-lacks social approach skills with peers

↓

Define Measurable Goals

-increase smile occurrence to 60% per opportunity
-increase peer interaction 70% per opportunity

↓

Pinpoint Behavior

-smiles when approaches peer
-joins play activities with others
-asks peer to help
-asks peer for play kick ball

↓

Can Behavior Be Performed?

↓

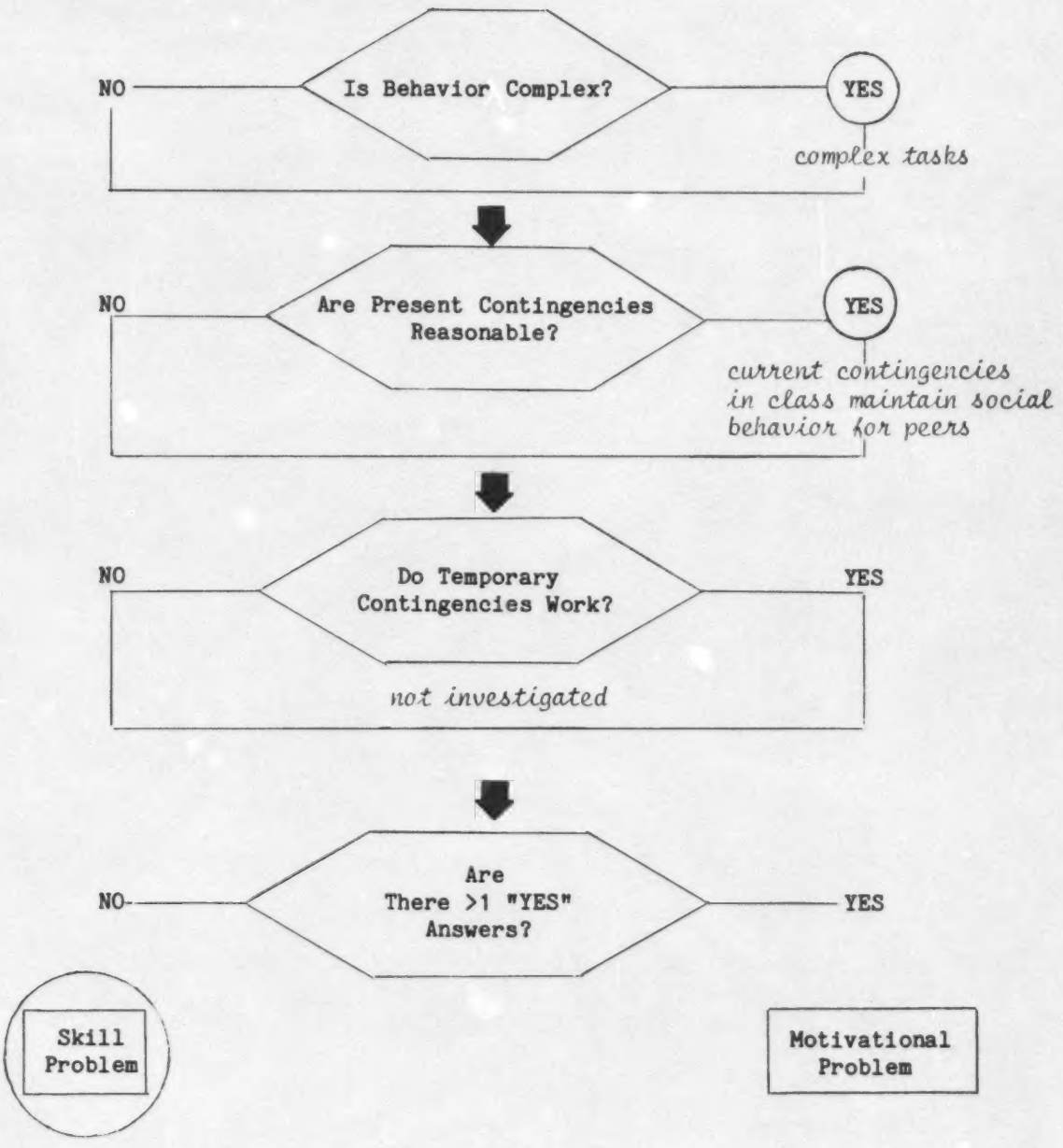
Has Behavior Been Observed in Past?

NO

YES

behaviors never observed

↓


Is Behavior Complex?
NO
YES
complex tasks
Are Present Contingencies Reasonable?
NO
YES
current contingencies in class maintain social behavior for peers
Do Temporary Contingencies Work?
NO
YES
not investigated
Are There >1 "YES" Answers?
NO
YES
Skill Problem
Motivational Problem

Generalization Issues

The generalization issues in the program included the following transfer of training problems. Randy's behavior had to transfer across settings, i.e. training setting ----> classroom ----> home, and across people, i.e. trainer ----> teacher ----> peers ----> father. We locate our generalization problem in this cell.

	Transfer of Training	
	One Setting	Multiple Settings
Skill Def.		
Motivation Def.		

To expand stimulus control in the school program; a peer was used in some training sessions, some training sessions were conducted on the playground, and the school social worker was included in the last three training sessions. Only social reinforcement was used in training, in order to decrease the possibility of a generalization problem arising from differences in reinforcers. Naturally occuring reinforcers for social approach behaviors were frequent in Randy's classroom and seemed likely to support the behaviors once they were established. An intervention program, consisting of modeling, behavior rehearsal, and social reinforcement was successful in establishing functionally effective social approach behaviors in school.

Intervention Modification

The problem in the program occurred in the home setting. The home component of the program had been designed following consultation with Randy's father and mother, and was finalized only when several program designs had been eliminated by Randy's father. See Performance Analysis Chart 2. Although Randy's father described the planned program as something he would enjoy and agreed to reinforce Randy's behavior as instructed, in fact, Randy's father found the attempted verbal exchanges that were to take place when they were working on the model, to be as uncomfortable as did Randy. Consequently, the father delivered reinforcement poorly and infrequently and it was insufficient to maintain Randy's approaches and the work on their joint project. The hoped for "naturally occurring reinforcers" were not present. The program was shifted to having Randy initiate one of two activities they both enjoyed, i.e. shooting baskets or playing frisbee.

The formal question and answer procedure was eliminated. The verbal interaction gradually increased as these activities maintained the contacts between Randy and his father.

The point is that it is necessary to consider the nature of the response class originally selected for modification and the contingencies for that response class that exist in other settings. Naturally occurring reinforcers are frequently available to maintain appropriate social skills once they are learned, but it is important to know if they are truly "appropriate" to the setting. One must analyze carefully the topographies that gain access to reinforcers in the settings to which the behavior is to generalize. In this case, there were no naturally occurring reinforcers for somewhat formal "question and answer" social exchanges.

PERFORMANCE ANALYSIS 2
HOME SETTING

Performance Deficiency Statement

-lacks social approach skills with father

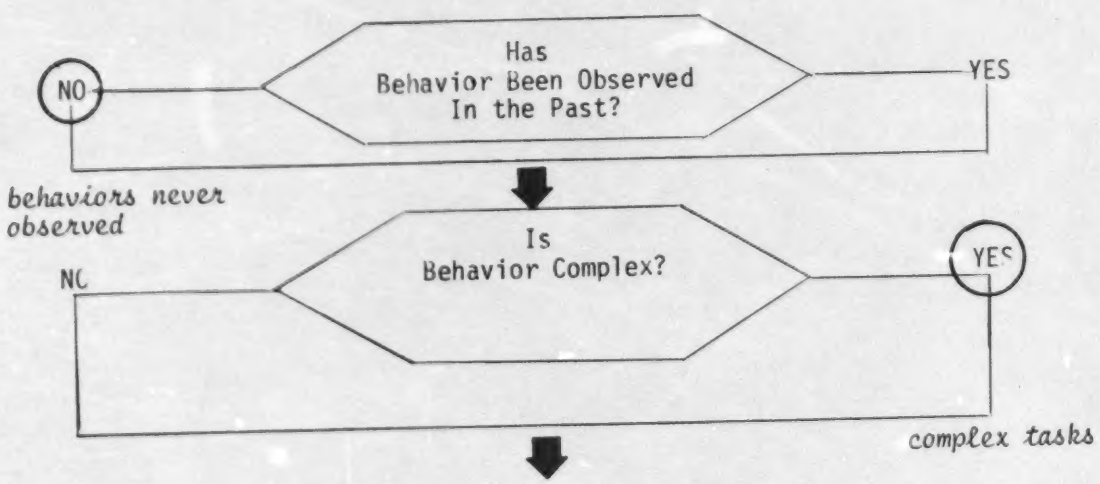
Define Measurable Goal

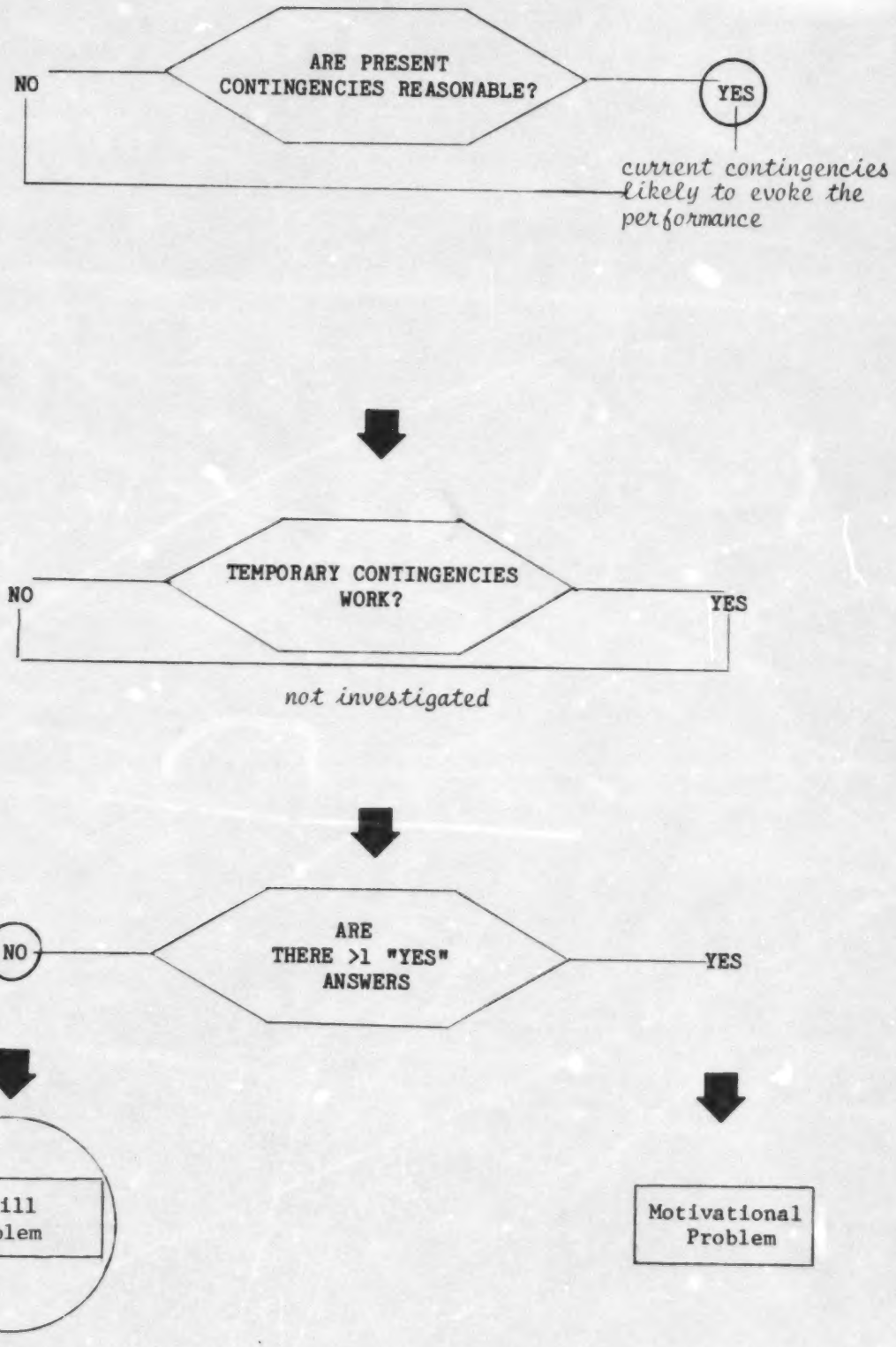
-increase smile occurrence with father to 50% per opportunity
-increase interaction with father to 80% per program designed opportunity

Pinpoint Behavior

-smiles with approaches father
-joins father in TV room
-ask father to help with model plane
-ask "what did you do today?"
-respond to father's similar question with description of one activity of the day

Can Behavior Be Performed?




ARE PRESENT CONTINGENCIES REASONABLE?
NO
YES
current contingencies likely to evoke the performance
TEMPORARY CONTINGENCIES WORK?
NO
YES
not investigated
ARE THERE >1 "YES" ANSWERS
NO
YES
Skill Problem
Motivational Problem

It is well to remember also that a social environment may not have a natural network of reinforcers to maintain desirable behavior and that, to the contrary, deviant behavior may be heavily reinforced by the attention it receives. The programming error in the example we've described, reminds us that one must directly observe and have a good understanding of the contingencies that are operating in all the settings where we plan to have behaviors transfer and maintain.

EXAMPLE 2: ARITA

Problem Description

Arita was a six-year-old girl in a kindergarten class of 18 students. Arita's primary problem was insufficient progress in academic skills. Arita was retained in kindergarten, and when progress appeared limited during the first two months of the second year, Arita was evaluated and placed in the resource room located in the school. The second referral came to the school psychologist when, although Arita's progress seemed satisfactory to the resource room teacher, Arita's kindergarten teacher reported that she was not seeing improvement in her classroom. Arita was consistently identifying upper and lower case letters, and numerals from 1 to 100 in the resource room setting and she was not doing so in her regular classroom. The kindergarten teacher requested assistance.

Description of Teaching Strategies in the Regular Classroom

In the kindergarten classroom, Arita was in a group with three other children learning the same skills. The children remained at their desks, which were located in close proximity to the teacher's desk. In a conference with the kindergarten teacher, the materials and procedures used to teach letter and numeral recognition were reviewed. It was found that the children performed a variety of tasks; they circled or matched items on worksheets, they cut out symbols, they colored symbols, they identified them on posters and strips hung in the room, and they used cards with the symbols displayed. Social reinforcement was the only reinforcement system in the kindergarten classroom, other than an occasional free time period on Friday if the teacher felt they had had a good week. The kindergarten teacher described no behavior problems with Arita and said that although Arita had relatively low skills in all areas, lack of skill development in math and reading readiness were her major concerns. Classroom observation indicated that Artia's symbol identification skills were irregularly performed. Arita was correctly responding, during periods of observation, 38 percent of the time. Symbol identification behavior in the classroom was not sufficiently established. Pinpointed behaviors were not occurring at levels necessary for her educational progress.

Initial Placement in Transfer of Training Matrix

	Transfer of Training	
	One Setting	Multiple Settings
Skill Def.		
Motivation Def.		*

See Performance Analysis Chart 3

The performance analysis continued to determine the answer to:

Can the behavior be performed?

1. Had the behavior been performed in the past?

   Answer: Certainly some form of the pinpointed behaviors were occurring in the resource room.

2. How complex is the task?

   Answer: Correct responses were required to stimuli changing along a variety of dimensions.

PERFORMANCE ANALYSIS 3
ARITA

PERFORMANCE DEFICIENCY

-problems with math and reading readiness skills

DEFINE MEASURABLE GOAL

-identify letters with 90% accuracy
-identify numerals with 90% accuracy
-match upper and lower case letters with 90% accuracy

PINPOINT BEHAVIOR

-can orally identify all upper and lower case letters with symbol is presented with 90% accuracy
-can mark with an X or circle on worksheet, all upper and lower case letters - with 90% accuracy
-can orally identify numerals 0-100 when symbol is presented - with 90% accuracy
-can mark with X or circle on worksheet numerals 0-100 with 90% accuracy
-can match upper and lower case letters on worksheet with 90% accuracy

3. Are contingencies present that are reasonably likely to reinforce performance?

   Answer: There were current contingencies of reinforcement in the classroom, i.e. the kindergarten teacher's attention and approval, that appeared to be adequately maintaining Arita's behavior in other classroom activities and tasks.

4. Consider temporarily establishing a set of contingencies that seem certain to be sufficient to evoke the behavior if the individual is able to perform. If the behavior is performed, the problem has been motivation. If it is not performed, the deficiency is one of skill.

The kindergarten teacher and the school psychologist established the following reinforcement contingency that they believed would establish effort and attention from Arita. It was announced to the students in Arita's group, that for each correct response, they would receive a poker chip, with which they could purchase new pencils. The teacher then gave them sample questions from all the categories of letter and numeral identification tasks she had been using in the classroom. Arita's correct response score was 32 percent.

Can the behavior be performed?

PERHAPS NOT

The transfer of training problem and the performance analysis now appear placed in this cell:

	Transfer of Training	
	One Setting	Multiple Settings
Skill Def.		*
Motivation Def.		

Teaching Strategies: Resource Room

Observation in the resource room indicated that the two settings, in which the same tasks were being taught, i.e. letter and numeral identification, were different from one another in several respects. Arita identified letters and numerals in the resource room from sets of single item cards that the resource room teacher had made. Arita was the only student involved in the exercise and sat across a small table from the resource room teacher. The cards were always presented in the same sequence and colored squares of paper for the resource room token economy were given after every correct response. The resource room teacher did a good job of establishing stimulus control with the curriculum materials and task procedures she designed. Unfortunately, she made the common mistake of teaching only one example of a skill she wanted more broadly exhibited. She needed to teach enough examples to have skills well established and to then choose examples to teach that represented the kinds of responses that made up the generalized class of symbol identification skills. Consideration of the transfer of training problem finds problems in two areas:

Transfer of Training

Skill Def.

√	1. Materials
√	2. Instructional specificity
	3. Language level

The resource room teacher altered her procedures and materials. She presented letter and numeral symbols in differing sizes, colors, styles and sequence. She changed the location of the work setting occasionally and sometimes she stood by her desk and presented curriculum materials in formats and sequences similar to the ones used by the kindergarten teacher. The resource room lessons eventually included worksheets, matching tasks, etc. As these changes were introduced, Arita's performance improved in the regular classroom, with the most significant improvements following the stimulus changes in; symbol size, style and simultaneous presentation. The two teachers had planned to use a student teacher who was coming to the kindergarten room the second semester as an additional trainer and common stimulus in the two settings. However, that proved to be unnecessary.

The resource room teacher changed her schedule of reinforcement as well. Although that had not appeared to be a critical distinction between the two settings in determining the difference in behaviors, the resource room teacher moved to an intermittent reinforcement schedule to improve behavior maintenance and to increase the ratio of social reinforcement to match more closely the reinforcement system available in the classroom.

Had these procedures not produced sufficient behavior changes, the staff might have considered introducing a common stimulus into the resource room. One of the children from Arita's classroom group could have been included in some of the learning trials, however, in this problem, the important factors appeared to be more closely related to materials and instructional procedure.

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